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Subject: Comments on [Docket No. FAA-1999-5835; Notice No. 99-08]

Revised Landing Gear Shock Absorption Test Requirement

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The drop rest requirements, as noted in the NPRM summary, currently "are essentially the same between the Federal Aviation Regulations and JAR". Rather than a harmonization issue, the stated purpose is to "address the capabilities of modern technology" and to provide for a comprehensive analysis of the combined dynamic systems for the landing gear and airplane including an accurate representation of all the landing gear dynamic characteristics.

Landing gear structure often requires the design and fabrication of forgings and is therefore a long lead item in the aircraft production. The drop test requires a finished, conformed, test article and therefore only shortly proceeds the flight test article. The goal of reducing new aircraft design and fabrication time, particularly in the regional and business aircraft market, will only further shorten the time between drop test and first flight. Any dynamic results obtained during the drop test could only be used to verify assumptions already used in the "sophisticated computer simulations that accurately represent the dynamic characteristics", and would only shortly proceed flight test measurements.

The landing gear input into the sophisticated computer simulations used to generate aircraft loadings is typically represented by either stiffness or flexibility matrices obtained from landing gear analytical models created prior to the availability of aircraft fuselage stiffness data. Drop tests utilize a rigid test fixture, and the data would be correlated with the rigid body model of the aircraft landing gear. The metering pin profile in the landing gear shock strut is modified during the drop test to ensure the landing loads fall within the predicted values.

Drop test results are used to validate design loads and energy absorption predictions. If the results of the drop test are within the predicted envelope, the existing design loads are left unaltered. Only if

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the drop test results are not enveloped within the predicted loads will a responsible manufacturer refine the original load assumptions and re-evaluate the existing stress analysis. Refinement of load approximations to incorporate dynamic characteristics measured during a drop test which successfully enveloped predicted loads will not physically alter the in process manufacturing of the remaining test articles, but has the potential for requiring a significant volume of calculation revision for a theoretical refined approximation of load values. Analysis work, which can not impact the final product configuration, is not productive or cost effective.

The proposals for the revised Sections 25.473(d) and 25.723(a) fail to fit into the timeline between design concept and first flight and therefore, rather than bring added value, only bring the potential for the determination of a second redundant and possibly different answer to an already completed product. The current regulations are both sufficient and in harmonization. The additional data proposed in this NPRM will arrive too late in the design process.

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